

Research Article

Cultivating Chinese Indigenous Innovation and Knowledge Creativity in Food Industry: Government Supports in Patent Application, Protection, Sharing and Utilization

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Abstract: This study aims to investigate the Chinese indigenous innovation and knowledge creativity in food industry. A set of Intellectual Property (IP) policies and high-level strategies, established by Chinese central government, were evaluated to cultivate and encourage indigenous innovations and creation of knowledge in food industry through enhancing the application, transfer and protection of patents. This study surveyed 80 food production related enterprises located in Jiangsu province, including 60 private-owned, 11 state-owned and 9 joint ventures. Then, 200 questionnaires were distributed through the Intellectual Property Office of Jiangsu, 102 were returned, in which 98 were evaluated as valid. The data collected exhibit that patent application has been widely employed as an effective approach not only to protect food products and service innovations, but also to promote enterprises' reputation, attract government financial and political supports, generate monetary or other profits from licensing or transferring patents and be eligible for tax reduction and exemption. Thus, the data analysis indicated that the governmental IP policies and strategies have strongly strengthened the indigenous innovations in food industry. However, the analysis also pointed out a series of problems and barriers in patent utilization. The conclusions thus advocate completing the national legislation system in IP and formulating specific supporting strategies at regional level by individual provincial IP administrative offices. The research study reported in this study is of interests to China IP policy makers and politicians, as well as the managers of Chinese enterprises interested in increasing organizational creativity and protecting their innovations.

Keywords: Food industry, indigenous innovation, knowledge creativity

INTRODUCTION

Chinese economy is facing a critical turn, as pointed out by the "12th Five Year Planning" that very recently published by the Chinese central government and that was expected to have the ultimate guiding power over the development of the nation during 2011-2015. Chinese food products industry has been developed into an extreme and cannot be further developed and expanded. Thus, it is paramount to cultivate a new form of organizations based on self scientific and technological innovations, having self developed intellectual properties and core technologies. These organizations should be the engine of economic development, should lead the domestic market and should be competitive in the international market. Only in this case, we can change from the 'Made in China' into 'Innovated in China' (Gong, 2009).

There are three core tasks urgently to be accomplished for the current Chinese economics reformation as pointed out by the "12th Five Year Planning". Firstly, it is necessary to shift the current economy from centring on the traditional low knowledge-intensive industry into high knowledge-

intensive industries. Secondly, the focal point of Chinese economy in the near future should be on the development of a number of private organizations, which not only should be able to survive in the domestic market, but also should be capable of competing with foreign companies in the international market. Thirdly, the development of Chinese organizations should be based on knowledge creation and innovation, the dissemination of knowledge among staff and the utilization of knowledge into value added processes and knowledge works (Gong, 2009).

However, the ambitious declaration made in "12th Five Year Planning" faces formidable obstacles and probably could not be easily achieved (Li, 2010). It has been widely accepted that the hitherto development and achievements in the development of Chinese economy mainly depended on importing and replicating knowledge developed from the outside, not through effectively managing, creating, sharing and utilising knowledge. In truth, Chinese food products industries are often limped by lacking knowledge and technology innovation and are limited by having self developed intellectual properties and core technologies (Li, 2010).

To change the negative image of China and to facilitate the upcoming economic transformation, very recently the Chinese government has established a set of national strategies, which aimed at using the patent system as a stimulus to encourage indigenous innovation and knowledge protection in food products industry. These strategies are established around four dimensions, namely, governmental financial supports, taxes exemption and reduction, personnel incentives and enforcing IP legislations and laws. However, it is unclear whether these national policies are in fact effective and could truly enhance the knowledge creation and innovation in Chinese food products industries.

In order to investigate the Chinese indigenous innovation and knowledge creativity in food industry, this study has investigated the Chinese central government political strategies on food products industry and the efforts made by individual provincial governments' political strategies have great effect on the indigenous innovation and knowledge creativity in food industry.

MATERIALS AND METHODS

Intellectual property, patent and knowledge:

According to the definition of World Intellectual Property Organization (WIPO), Intellectual property (IP) refers to the creation of mind, which includes inventions, literary and artistic works, symbols, names, images and designs used in commerce. In China, the current management system of IP consists of three main components by law, namely, patents, trademarks and copyrights. As widely accepted in the academia and Chinese IP administration agencies, patents can be represented to the output of technology and is the most important type of IP in the organizations (Liu and Xu, 1993).

According to the "Patent Law of the People's Republic of China", there are three types of patents, namely, inventions, utility models and designs. Patents are granted, once evaluated as novel, creative and of practical use. Novelty means that the proposed inventions or utility models are entirely new, not an existing technology. Creativity refers that the invention possesses prominent and substantive advancements, comparing to the existing technologies. Practical use refers that the invention or utility model can be made or used and can produce effective results.

Patents can be generally viewed as knowledge that is newly created (Najib, 1995). Specifically, patents are a form of explicit knowledge, which has been expressed and formatted in words and numbers, is officially evaluated and proven as valid and is credited as novel, creative and of practical use. Therefore, the patent application is not just an approach of protecting the newly developed knowledge, but also a systematic process of transforming organizational tacit knowledge into explicit and an effectively approach to elicit and identify the true usability of newly developed knowledge. For this particular reason, the patent application system has been employed by the Chinese government to stimulate and evaluate innovations and the creation of knowledge in Chinese organizations.

Knowledge creation: Knowledge Creation (KC) can be considered as the core of organizational management (Nonaka, 1994). In fact, KC is not a new topic in academia. Current theory developments and practical works in KC are performed upon the cornerstone laid by Nonaka and Takeuchi (1995), who proposed that "organizational knowledge creation is a continuous and dynamic interaction between tacit and explicit knowledge". Upon this core concept, Nonaka and Takeuchi (1995) developed a knowledge creation model, which consists of four stages of knowledge conversion, namely: socialization, externalization,

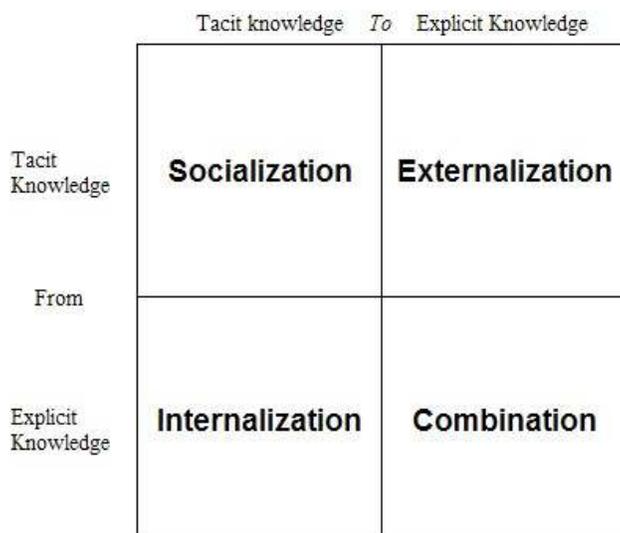


Fig. 1: Knowledge creation model

combination and internalization. The four stages are presented in Fig. 1.

Socialization: From tacit to tacit. A process of creating new tacit knowledge through social interaction to share knowledge and experience. This type of knowledge conversion usually takes place in informal non-work social meetings. Socialisation can also occur in the traditional master-apprentice type of learning, in which apprentices learn the craft of their masters through observation, imitation and practice.

Externalization: From tacit to explicit. A process of articulating tacit knowledge into explicit knowledge, through storytelling and the use of metaphors, analogies and models.

Combination: From explicit to explicit. A process of creating new explicit knowledge by combining or merging explicit knowledge, which is gathered from both inside and outside the organization.

Internalization: From explicit to tacit. A process of internalising explicit knowledge into personal tacit knowledge. In this process, explicit knowledge is internalised to become part of individuals' tacit knowledge in forms of shared mental models and know-how.

These four modes of conversion cannot be taken as independent, as in fact they are highly inter-dependent. Each mode relies on, contributes to and benefits from other modes. Additionally, Nonaka and Takeuchi (1995) propose that the continuation of the four modes of knowledge creation should be viewed in a spiral, in which knowledge is continuously transformed, amplified, created and shared.

In fact, the knowledge creation model can be adopted to frame the process of patent generation, application and dissemination and utilization. Therefore, as the perspective adopted by the Chinese government as well as in this study, by enforcing the generation and application of patents, Chinese organizations could be more actively engaged in activities of knowledge creation, sharing knowledge

and reciprocate patents and finally, applying patents and incorporated knowledge into value-adding business operations.

RESEARCH METHODOLOGY

This study adopted the quantitative approach. Moreover, considering the practicality of research, it is impossible to survey all organizations in China. This study thus focus on one of the provinces in China, namely, Jiangsu Province, which had the highest rate of patent application among all Chinese provinces and autonomy regions since 2008, as shown in Table 1. It is presumed that the large number of patent application and accreditation in Jiangsu was resulted by active creation of knowledge in the organizations in this province.

Questionnaires were adopted as the data collection tool in order to gather data from a large quantity of Chinese food products companies. The questionnaires were designed in four dimensions, namely, organizational information, organizational patent application information, patent transfer information and government support.

A total of 200 companies were selected as the research sample and surveyed. These organizations were selected according to the three following criteria:

- The selected organizations must be in food products industry.
- The selected organizations must have good reputations and records in knowledge creation. Specifically, the organizations selected should not only have at least 5 patents accredited in the past 3 years, but also have had at least 1 patent been used in the practice.
- The selected organizations must have received government financial and political supports during the past 3 years.

In order to ensure the validity and reliability of the results returned, questionnaires were distributed by the Intellectual Property Office of Jiangsu Province. Then, 102 questionnaires were returned, i.e., the return rate

Table 1: Top 10 patent application provinces in mainland China

| Regions | Accumulated number | 1985-2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|-----------|--------------------|-----------|-------|--------|--------|--------|--------|--------|--------|
| Guangdong | 1335381 | 333961 | 90886 | 102449 | 103883 | 125673 | 152907 | 196272 | 229514 |
| Jiangsu | 1656330 | 156409 | 53267 | 88950 | 128002 | 174329 | 235873 | 348381 | 472656 |
| Zhejiang | 1046133 | 179102 | 52980 | 68933 | 89931 | 108482 | 120742 | 177066 | 249373 |
| Shandong | 685764 | 154787 | 38284 | 46849 | 60247 | 66857 | 80856 | 109599 | 128614 |
| Shanghai | 584436 | 152038 | 36042 | 47205 | 52835 | 62241 | 71196 | 80215 | 82682 |
| Beijing | 546113 | 166888 | 26555 | 31680 | 43508 | 50236 | 57296 | 77955 | 92305 |
| Shenzhen | 398742 | 68557 | 29728 | 35808 | 36249 | 42279 | 49430 | 63522 | 73169 |
| Liaoning | 319129 | 123560 | 17052 | 19518 | 20893 | 25803 | 34216 | 37102 | 41152 |
| Sichuan | 318357 | 72553 | 13109 | 19165 | 24335 | 33047 | 40230 | 49734 | 66312 |
| Hubei | 267994 | 62665 | 14576 | 17376 | 21147 | 27206 | 31311 | 42510 | 51316 |

was 51% and the other 93 were evaluated as valid. These organizations were 60 private-owned organizations, 11 state-owned organizations and 9 joint ventures.

RESULTS AND DISCUSSION

Results: There are various purposes for applying for patents. The top three purposes are protecting new product, licensing income and strategic purposes (Duguet and Kabla, 1998).

According to the data collected, the surveyed 93 companies showed a number of purposes when applying for patents. Table 2 lists the purposes.

As shown in Table 2, 95.69% surveyed companies considered the primary purpose for applying for patents was to protect inventions, innovations and newly created knowledge. This purpose, however, is not supported by the IP strategies formulated and implemented in Jiangsu. In fact, due to patent application demands to reveal, evaluate and make public all technical details, the protection duration is 20 years, a large number of organizations in China have very limited intention or even refuse to protect their inventions through applying for patents, then use know-how to protect their core creations, such as the proprietary Chinese medicine formulas of Tongrentang have hundreds of years history and nobody know their secret, another famous case is the formula of Cocacola in U.S.A.

Moreover, 76.34% sampled companies use patents to increase their reputation, in order to gain higher market share. It is important to highlight that only 29.03% sampled organizations applied for patents in order to attract government supports. It implies that the existing governmental strategies may not entirely suitable for the needs of individual organizations.

Additionally, even though IP and patent application are valued as critically important to the consistent organizational development and profitability, the research results however exhibit that patent application could be viewed as not directly related to the profitability to the sampled companies. As shown in Table 3, the main purposes for patent application are “protecting new products” (95.69%) and “increasing organization reputation” (76.34%), significantly higher than “attracting government support” (29.03%), “merchandising patents (provide licensing and transfer services)” (18.28%) and “taxes reduction and exemption” (16.13%), which in fact could bring considerable amount of profits, governmental financial investment and reduction of tax expenditure. This finding deserves further and more in-depth investigations.

Despite the central government and regional IP administration agencies have been pushing individual organizations to apply for patents and been expecting this strategy could substantially stimulate indigenous

Table 2: Purposes of the patent applications

| Purpose | Quantity | Percentage |
|------------------------------------|----------|------------|
| Protecting new products | 89 | 95.69% |
| Increasing organization reputation | 71 | 76.34% |
| Attracting government support | 27 | 29.03% |
| Merchandising patents | 17 | 18.28% |
| Taxes reduction and exemption | 15 | 16.13% |

Table 3: Challenges of knowledge creation

| Challenges to knowledge creation | Rate (%) |
|----------------------------------|----------|
| High initial investments to R&D | 29 |
| Lack of long-term vision | 23.66 |
| Lack of R&D personnel | 15.05 |

knowledge creation in local organizations, creating new knowledge and achieving advancements in innovation are in fact not easy tasks. The data gathered in this study reveal four main challenges of knowledge creation.

As shown in Table 3, the main obstacle for creating new knowledge is the threshold of high initial investments to R&D. As perceived and considering the government only provide financial supports after the patent accreditation, organizations may not have sufficient fund to sponsor necessary research and knowledge creation activities. Therefore, it could be more effective if the government financial supports could be delivered beforehand and aimed at supporting the process of R&D.

Another challenge revealed by the data was the lack of long-term vision. It has been widely criticised that Chinese organizations are short-sighted, they very often “focuses on rapid financial incomes and willing to neglect long-term organizational development and financial profits”.

Finally, 15.05% sampled companies pointed out that the lack of R&D personnel is a challenge. It is perceived that a number of organizations probably have been encountered this problem when creating new knowledge or services in-house.

Analysis: The utilisation of patent is a very difficult task, as only 5% patents were finally used in real practice. The results of this study point out that only 4% sampled companies intend to utilise their patents into their own organizations. It was also found that only 18.28% sampled organizations aim at transferring their patents. This finding is consistent with the findings presented in the previous section, which identifies that Chinese organizations are mainly aimed at protecting new products and increasing organization reputation, not making profits from commercialising and licensing patents. This finding explains the very low rate of patent transfer.

Moreover, the research results point to the following barriers to patent transfer and licensing, as presented in Table 4.

As shown in Table 4, patent could be very difficult to be licensed. About 37.63% companies surveyed in

Table 4: Barriers to patent transfer

| Barriers to patent transfer | Rate (%) |
|---|----------|
| Difficult to transfer, due to lacking of relevant supporting platforms | 37.63 |
| High initial investment in patent generation and unable to obtain external investment result in lacking of funding in patent implementation | 34.40 |
| Lack of specific regulations and guidance in facilitating patent transfer | 9.68 |
| Patents lack of usability and poorly constructed supporting documents result in unforeseeable market opportunity | 4.30 |

this study identify that the difficulty is caused by lacking of relevant supporting platforms in the market. Specifically, a number of companies claimed that it is necessary to establish patent trading platforms or systems, which could be developed by the government or patent administration offices, which have the ultimate authority and control over the platform. It is also necessary to establish patent trading agencies that can connect the patent holders and those who in need of patents, in order to disseminate and trade patents more effectively. Also, the patent trade agencies can develop online commercial systems in facilitating patent transfer and licensing. There are in fact some patent systems in use in China, but these systems are designed to retrieve patent data, not to trade patent.

Furthermore, another significant barrier is the lack of funding for patent implementation, resulted by initial high investment in patent generation and difficulty in securing external financial investment. About 34.40% sampled companies considered this as a patent transfer barrier. Some scholars point out that the funding for patent implementation is very important for patent transfer. It is important to note that the Chinese government and the Jiangsu IP office as concerned in this study have specific strategies and provide financial support aimed at encouraging patent transfer, yet lacking of sufficient funding in patent transfer still emerged as a significant barrier. This result indicates that the existing strategies and support may not have expected effect.

Moreover, 9.68% sampled organizations assert that lacking of specific regulations and guidance is an important barrier to patent transfer. This result reveals the absence of regulations and guidance on patent transfer and a lack of political attention on not only establishing relevant regulation and legislation, but also providing official guidance and professional advices.

Finally, despite the government has consistently putting efforts on completing the system of patent evaluation and has repetitively emphasised on the prevention of malpractices during patent application, the data gathered in this study reveal that 4.30% surveyed organizations still consider lacking of real usability and poorly constructed supporting documents are a barrier to patent transfer.

Despite the Chinese government have realised the importance of knowledge creation in Chinese organizations and intend to use IP to encourage and protect knowledge creation, current national policies and strategies may not entirely suitable to the organizational needs of development. Table 5 lists the government supports.

Table 5: Analysis of government supports

| Government supports | Rate (%) |
|---|----------|
| Financial support | 81.10 |
| Taxes exemption and reduction | 79.60 |
| Political support for bank loan application | 46.23 |
| Completing IP laws and legislation | 0.15 |
| Developing a multi-layer patent services offices and agents | 0.14 |
| Creating a fair-competing market environment | 0.10 |
| Developing market financial service system | 0.05 |

As shown in Table 5, organizations could be more responsive to government policies, which were articulated in three themes, namely, providing governmental financial support, taxes exemption and reduction and political supports on bank loan application. According to the results, it become clear that food product organizations are more concerned with those policies directly related to individual organizations' immediate profits and more likely to receive financial supports through knowledge creation and patent application. In fact, the less concerned policies are mostly related to the long-term organizational profit and market development orientation.

It should be noted that, according to the findings of this study, only 29.03% sampled companies apply for patents in order to secure government financial supports. Instead, companies are more concerned with protecting new products and increasing organization reputation, for which, however, no policies and strategies have been established. Thus, political efforts need to be made aiming at breaking the barriers to patent transfers. According to the results of this study:

- Patent trading platforms and agencies should be established.
- Not just effective financial supports, but necessary trainings and intellectual supports should be provided in patent utilisation.
- The government should continue completing and enforcing rigorous examination during the processes of patent accreditation in order to ensure the quality and applicability of patents.

CONCLUSION

According to the data gather in this study, it become evident that the existing policies and strategies are effectively in encouraging knowledge creation and innovation as well as cultivating indigenous Chinese knowledge food products organizations. However, it was also found in this study that current strategies are

overly emphasis on monetary and financial supports, whereas Chinese food products organizations are more willing to use patents to protect their innovation and to increase organizational reputation. No policies have been formulated insofar focusing on the two areas. So, it is necessary to establish effective strategies in resolving challenges in knowledge creation. Firstly, the government should establish funds aiming at providing support in R&D and knowledge creation. By doing so, the food products organizations can not only have initial government supported financial support, but also adjust their “short-sighted vision” into long-term strategic planning and development. Secondly, strategies should be established in encouraging Chinese food products organizations to construct their own competent R&D teams.

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REFERENCES

- Duguet, E. and I. Kabla, 1998. Appropriation strategy and the motivations to use the patent system: An econometric analysis at the firm level in French manufacturing. *Annal. Econ. Stat.*, 49(50): 89-327.
- Gong, Y., 2009. Transition technology to explain the short-sighted behavior. *Econ. Res. Guide*, 68(30): 176-178.
- Li, W., 2010. The analysis of the performance of patent subsidy policy: an empirical study of Nongbo. *Forum Sci. Technol. China*, 10(1): 79-82.
- Liu, X. and Z. Xu, 1993. The evaluation of scientific and technological outputs and advantage all over the country using patent data. *Stud. Sci. Sci.*, 11(3): 65-69.
- Najib, H., 1995. Appropriability of technical innovations an empirical analysis. *Res. Policy*, 24(6): 981-992.
- Nonaka, I., 1994. A dynamic theory of organizational knowledge creation. *Organ. Sci.*, 5(1): 14-37.
- Nonaka, I. and H. Takeuchi, 1995. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press, Oxford.